

1/19/16

HW: Review Sheet #1-19 due Tomorrow  
#20-38 due Thursday

Test Friday 1/22

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Name: \_\_\_\_\_  
Algebra 2 CC Review for Midterm

SHOW ALL WORK ON SEPARATE PAPER! Be sure to review your old notes and tests as well.

1) Simplify:  $\frac{\sqrt{75}}{\sqrt{3}} = \sqrt{25} = 5$

A)  $\frac{5\sqrt{3}}{3}$

B) 25

C) 5

D)  $5\sqrt{3}$

2) Simplify:  $2\sqrt{3}(3\sqrt{6} - 3\sqrt{3})$

A)  $12\sqrt{3} - 18$

B)  $18\sqrt{2} - 18$

C)  $3\sqrt{6} - 6\sqrt{3}$

D) 18

3) The roots of the equation  $x^2 + 6x + 11 = 0$  are

A) real, rational, and unequal

C) real, irrational, and unequal

B) real, rational, and equal

D) imaginary

4) What is the sum of  $\frac{5}{3}x^2 - \frac{8}{5}x + \frac{7}{8}$  and  $-\frac{3}{5}x^2 - \frac{1}{2}x + \frac{1}{4}$ ?

A)  $\frac{2}{15}x^2 - \frac{9}{10}x + 1$

C)  $\frac{16}{15}x^2 - \frac{21}{10}x + \frac{9}{8}$

B)  $\frac{8}{15}x^2 - \frac{9}{10}x + 2$

D)  $x^2 - \frac{9}{7}x + \frac{2}{3}$

5) What are the sum (S) and product (P) of the roots of the equation  $3x^2 - 7x + 12 = 0$ ?

A)  $S = \frac{7}{3}, P = -4$

C)  $S = -\frac{7}{3}, P = -4$

B)  $S = 7, P = 12$

D)  $S = \frac{7}{3}, P = 4$

$$2) \quad 2\sqrt{3} (3\sqrt{6} - 3\sqrt{3})$$

$$6\sqrt{18} - 6\sqrt{9}$$

$$6\sqrt{9\sqrt{2}} - 6(3)$$

$$6 \cdot 3\sqrt{2} - 18$$

$$\boxed{18\sqrt{2} - 18}$$

(B)

$$3) \quad \text{Discriminant} \quad b^2 - 4ac$$

$$x^2 + 6x + 11 = 0$$

$$a = 1$$

$$b = 6$$

$$c = 11$$

$$b^2 - 4ac$$

$$6^2 - 4(1)(11)$$

$$36 - 44$$

$$-8$$

↑  
Negative therefore imaginary roots

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$4) \quad \left( \left( \frac{5}{3} \right) x^2 - \frac{8}{5} x + \frac{7}{8} \right) + \left( \left( -\frac{3}{5} \right) x^2 - \frac{1}{2} x + \frac{1}{4} \right)$$

$$\frac{5}{3} + \frac{-3}{5} = \frac{16}{15}$$

$$-\frac{8}{5} + \frac{-1}{2} = \frac{-21}{10}$$

$$\frac{7}{8} + \frac{1}{4} = \frac{9}{8}$$

$$\boxed{\frac{16}{15}x^2 - \frac{21}{10}x + \frac{9}{8}}$$

$$5) \quad 3x^2 - 7x + 12 = 0$$

$$a = 3$$

$$b = -7$$

$$c = 12$$

$$\text{sum} = \frac{-b}{a} = \frac{-(-7)}{3} = \boxed{\frac{7}{3}}$$

$$\text{Product} = \frac{c}{a} = \frac{12}{3} = \boxed{4}$$

(D)

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- 6) What is the product of  $(2 + a)$  and  $(3 - b)$ ?  
A)  $6 - 2b + 3a - ab$  C)  $6 - ab$   
B)  $6 + ab - b^2$  D)  $5 + ab + 3a - 2b$
- 7) If  $(\sqrt{18} + \sqrt{2})$  is divided by  $\sqrt{2}$ , the result is  
A) 16 B) 4 C) 3 D)  $\sqrt{10}$
- 8) What is the magnitude of the complex number  $z = 5 + 12i$ ?  
A) 13 B) 17 C) 7 D) 169
- 9) Which of the following numbers is the discriminant of a quadratic equation whose roots are real, unequal, and irrational?  
A) -5 B) 0 C) 7 D) 4
- 10) Which of the following correctly shows the factoring of  $x^3 + 27$ ?  
A)  $(x + 3)(x^2 - 3x + 9)$  C)  $(x + 3)(x + 3)(x + 3)$   
B)  $(x + 3)(x^2 + 3x - 9)$  D)  $(x + 3)(x - 3)(x - 3)$
- 11) What is the quotient when  $x^3 - 2x^2 - 9$  is divided by  $x - 3$ ?  
A)  $x^2 - x - 6$  B)  $x^2 - 5x + 6$  C)  $x^2 + x - 6$  D)  $x^2 + x + 3$
- 12) Which of the following equations is the solution to  $x^2 + 14x + 3 = 0$  after completing the square?  
A)  $(x - 7)^2 = 52$  C)  $(x + 7)^2 = 46$   
B)  $(x + 7)^2 = 52$  D)  $(x - 7)^2 = 46$

Half  
Square  
Share

$$x^2 + 14x + \boxed{49} = -3 + \boxed{49}$$
$$(x + 7)^2 = 46$$
$$\frac{14}{2} = 7 \quad 7^2 = 49$$

6) Product means multiply

$$(2+a)(3-b)$$

$$6 - 2b + 3a - ab \quad \textcircled{A}$$

$$7) \frac{\sqrt{18} + \sqrt{2}}{\sqrt{2}} = \frac{\sqrt{18}}{\sqrt{2}} + \frac{\sqrt{2}}{\sqrt{2}} \quad \textcircled{B}$$

$$\sqrt{9+1}$$

$$3+1 = \textcircled{4}$$

8)  $z = 5 + 12i$

$$|z| = \sqrt{5^2 + 12^2}$$

$$= \sqrt{25 + 144}$$

$$= \sqrt{169}$$

$$|z| = 13 \quad \textcircled{A}$$

$$z = a + bi$$

$$|z| = \sqrt{a^2 + b^2}$$

9) Real, unequal, irrational  
Discriminant: Positive, NOT 0, NOT Perfect Square  
 $\textcircled{C}$

10)  $x^3 + 27$  SOAP for perfect cubes

$$\sqrt[3]{x^3} = x$$

$$\sqrt[3]{27} = 3$$

$$(x+3)(x^2 - 3x + 3^2)$$

$$(x+3)(x^2 - 3x + 9) \quad \textcircled{A}$$

11)  $x^3 - 2x^2 - 9$

①  $x^2 + x + 3$

$$\begin{array}{r} x-3 \overline{) x^3 - 2x^2 + 0x - 9} \\ \underline{x^3 - 3x^2} \phantom{+ 0x - 9} \\ x^2 + 0x \phantom{- 9} \\ \underline{x^2 - 3x} \phantom{- 9} \\ 3x - 9 \\ \underline{3x - 9} \\ 0 \end{array}$$

$\frac{x^3}{x} = x^2$   
 $\frac{x^2}{x} = x$   
 $\frac{3x}{x} = 3$

$$\text{Sum} = (3+i) + (3-i) = 6$$

$$\text{Product} = (3+i)(3-i) = 10$$

$$x^2 - 6x + 10 = 0$$

$$x^2 - (\text{sum})x + (\text{product}) = 0$$

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13) Which equation has the roots  $3 + i$  and  $3 - i$ ?

A)  $x^2 + 6x - 8 = 0$

C)  $x^2 + 6x - 10 = 0$

B)  $x^2 - 6x + 10 = 0$

D)  $x^2 - 6x + 8 = 0$

14) The sum of  $\sqrt{-18}$  and  $\sqrt{-72}$  is

A)  $36i$

B)  $3\sqrt{10}$

C)  $6i$

D)  $9i\sqrt{2}$

15) The value of  $2i^8$  is

A)  $-2$

B)  $-2i$

C)  $2i$

D)  $2$

16) Which equation has both 3 and 6 as roots?

A)  $\sqrt{x-2} = \frac{x}{3}$

B)  $\sqrt{3-2} = \frac{3}{3}$

C)  $\sqrt{x-2} = x-4$

D)  $\sqrt{x-2} = 4-x$

$$\sqrt{6-2} = \frac{6}{3}$$

$$\sqrt{4} = 2$$

$$2 = 2$$

$$\sqrt{3-2} = 1$$

$$1 = 1$$

17) Simplify:  $\left(\frac{x^2-4}{10x}\right)\left(\frac{5x^2}{x^2+2x}\right)$ 

A)  $\frac{x+2}{2x}$

B)  $\frac{x-2}{2}$

C)  $x-1$

D)  $\frac{x-2}{2x}$

18) For which value(s) of  $x$  is the function  $f(x) = \frac{x^2-9}{x-7}$  undefined?

A)  $9$

B)  $3$  and  $-3$

C)  $7$

D)  $3$ , only

19) Simplify:  $(7-x\sqrt{x})^2$ 

A)  $49 - 14x\sqrt{x} + x^3$

C)  $9 - 7x\sqrt{x} + x^3$

B)  $49 - x^3$

D)  $49 - 14x\sqrt{x} + x^2$

FOIL

$$(7-x\sqrt{x})(7-x\sqrt{x})$$

$$49 - 7x\sqrt{x} - 7x\sqrt{x} + x^2x$$

$$49 - 14x\sqrt{x} + x^3$$

14)  $\sqrt{18} + \sqrt{72}$  <sup>sum</sup>

$i \sqrt{18}$   $i \sqrt{72}$   
 $\downarrow \quad \wedge$   $\downarrow \quad \wedge$   
 $i \sqrt{9} \sqrt{2}$   $i \sqrt{36} \sqrt{2}$   
 $i 3\sqrt{2}$   $i 6\sqrt{2}$   
 $3i\sqrt{2} + 6i\sqrt{2}$   
 $9i\sqrt{2}$

17)  $\frac{x^2-4}{10x} \cdot \frac{5x^2}{x^2+2x}$

$\frac{(x-2)(x+2)}{10x} \cdot \frac{5x^2}{x(x+2)} = \frac{x-2}{2}$

18) undefined means  
the denominator = 0

$$\begin{array}{r} x-7=0 \\ +7 \quad +7 \\ \hline \end{array}$$

$x=7$  the fraction  
will be undefined

$$\begin{aligned}
 & 6\sqrt{54} - 3\sqrt{24} - 8\sqrt{96} \\
 & 6\sqrt{9\sqrt{6}} - 3\sqrt{4\sqrt{6}} - 8\sqrt{16\sqrt{6}} \\
 & 6 \cdot 3\sqrt{6} - 3 \cdot 2\sqrt{6} - 8 \cdot 4\sqrt{6} \\
 & 18\sqrt{6} - 6\sqrt{6} - 32\sqrt{6} \\
 & (18 - 6 - 32)\sqrt{6} \\
 & -20\sqrt{6}
 \end{aligned}$$

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20) Simplify:  $6\sqrt{54} - 3\sqrt{24} - 8\sqrt{96}$

A)  $8\sqrt{6}$

B)  $-20\sqrt{6}$

C)  $3\sqrt{30} - 8\sqrt{6}$

D)  $10\sqrt{6}$

21) Solve:  $\frac{3}{x} - 2 = \frac{-2x}{x+1}$

A) 3

B) -4

C) 6

D) -3

22) Simplify:  $\sqrt{72}$

$$\begin{aligned}
 & \sqrt{9\sqrt{8}} \\
 & 3\sqrt{8}
 \end{aligned}$$

$$\begin{aligned}
 & 3\sqrt{8} \\
 & \downarrow \sqrt{4\sqrt{2}} \\
 & 3 \cdot 2\sqrt{2} \\
 & 6\sqrt{2}
 \end{aligned}$$

23) Combine and simplify:  $6\sqrt{20} - 2\sqrt{80}$

24) Combine and simplify:  $2\sqrt{18x^2} + 3x\sqrt{2}$

25) Simplify:  $(6x^2 + 11x - 10) \div (2x + 5)$

$$\begin{array}{r}
 6x^2 + 11x - 10 \\
 \underline{2x + 5}
 \end{array}$$

$$\begin{array}{r}
 3x - 2 \\
 2x + 5 \overline{) 6x^2 + 11x - 10} \\
 \underline{-(6x^2 + 15x)} \downarrow \\
 -4x - 10 \\
 \underline{-(4x + 10)} \\
 0
 \end{array}$$

26) Simplify:  $\frac{12}{3\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} = \frac{12\sqrt{8}}{3 \cdot 8}$

$$\begin{aligned}
 & \frac{12\sqrt{8}}{24} = \frac{\sqrt{8}}{2} = \frac{\sqrt{4\sqrt{2}}}{2} = \frac{2\sqrt{2}}{2} = \sqrt{2}
 \end{aligned}$$

27) Solve for x:  $\frac{1}{x} + \frac{3}{1} = \frac{7}{2}$

$$\begin{aligned}
 & \text{LCD} \\
 & 2x \left( \frac{1}{x} + \frac{3}{1} \right) = \frac{7}{2} (2x) \\
 & \frac{1}{x} + \frac{3}{1} = \frac{7}{2}
 \end{aligned}$$

rest:  $x \neq 0$

$$\begin{aligned}
 & 2 + 6x = 7x \\
 & \underline{-6x \quad -6x} \\
 & 2 = x
 \end{aligned}$$

21)  $\frac{3}{x(x+1)} - 2 = \frac{-2x(x)}{x+1(x)} \quad \text{LCD: } x(x+1)$

$$\frac{3x+3}{x(x+1)} - \frac{2x^2+2x}{x(x+1)} = \frac{-2x^2}{x(x+1)} \quad \begin{matrix} x \neq 0 \\ x \neq -1 \end{matrix}$$

$$\begin{array}{r} 3x+3 - 2x^2 - 2x = -2x^2 \\ +2x^2 \qquad \qquad +2x^2 \\ \hline 3x+3 - 2x = 0 \end{array}$$

$$x+3 = 0$$

$$\boxed{x = -3} \quad \checkmark$$

23)  $6\sqrt{20} - 2\sqrt{80}$

$$\begin{aligned} & 6\sqrt{4 \cdot 5} - 2\sqrt{16 \cdot 5} \\ & 6 \cdot 2\sqrt{5} - 2 \cdot 4\sqrt{5} \\ & 12\sqrt{5} - 8\sqrt{5} \\ & \boxed{4\sqrt{5}} \end{aligned}$$

24)  $2\sqrt{18x^2} + 3x\sqrt{2}$

$$\begin{aligned} & 2\sqrt{9x^2 \cdot 2} \\ & 2 \cdot 3x\sqrt{2} \quad \downarrow \\ & 6x\sqrt{2} + 3x\sqrt{2} \\ & \boxed{9x\sqrt{2}} \end{aligned}$$

25) Box

	$2x + 5$	
$6x^2$ ←	$6x^2$	$3x$
	$-10$	$-2$
$+11x$ ←	$-10$	



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- 28) Write an expression to represent  $ax - ay - bx + by$  when factored completely.

$$a(x-y) - b(x-y)$$

$$(a-b)(x-y)$$

- 29) Write an expression to represent  $4x^2 - 9$  when factored completely.

$$(2x-3)(2x+3) \quad \text{Dots}$$

- 30) What is the value of  $y$  in the equation  $(y-2)^2 = 6^2$ ?

$$y-2=25$$

$$+2 \quad +2$$

$$y=27 \quad \checkmark$$

- 31) Solve the given equation by completing the square. [Express the answer in simplest radical form if necessary.]

$$c^2 - 3c - 18 = 0$$

$$+18 \quad +18$$

$$\left(-\frac{3}{2}\right)^2 = \frac{9}{4}$$

$$c^2 - 3c + \frac{9}{4} = 18 + \frac{9}{4}$$

$$\left(c - \frac{3}{2}\right)^2 = \frac{81}{4}$$

$$c - \frac{3}{2} = \pm \sqrt{\frac{81}{4}}$$

$$c - \frac{3}{2} = \pm \frac{9}{2}$$

$$c = \frac{3}{2} \pm \frac{9}{2}$$

$$c = 6, -3$$

- 32) What is the solution of the quadratic equation  $2x^2 + x = 7$ ?

A)  $\frac{1 \pm \sqrt{57}}{4}$       B)  $\frac{1 \pm \sqrt{57}}{2}$       C)  $\frac{-1 \pm \sqrt{57}}{2}$       D)  $\frac{-1 \pm \sqrt{57}}{4}$

- 33) Solve the given expression using the quadratic formula. [Express the answer in simplest radical form.]

$$2(x^2 - 1) = 3x$$

$$32) \quad 2x^2 - x = 7$$

$$\quad \quad \quad -7 \quad -7$$

$$2x^2 - x - 7 = 0$$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$$

$$a=2$$

$$b=-1$$

$$c=-7$$

$$x = \frac{1 \pm \sqrt{57}}{4}$$

(A)

$$33) \quad 2(x^2 - 1) = 3x$$

$$2x^2 - 2 = 3x$$

$$2x^2 - 3x - 2 = 0$$

$$a=2$$

$$b=-3$$

$$c=-2$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-2)}}{2(2)}$$

$$x = \frac{3 \pm \sqrt{25}}{4}$$

$$\frac{3+5}{4} = \frac{8}{4} = 2$$

$$x = \frac{3-5}{4} = \frac{-2}{4} = -\frac{1}{2}$$

$$\frac{3-5}{4} = -\frac{2}{4} = -\frac{1}{2}$$

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34) Express in simplest form in terms of  $i$ :  $\sqrt{-27}$ 

$$\begin{aligned} & i\sqrt{27} \\ & i\sqrt{9 \cdot 3} \end{aligned}$$

$$\rightarrow 3i\sqrt{3}$$

35) Find the discriminant:  $2y^2 + 3y + 2 = 0$ 

$$b^2 - 4ac$$

$$3^2 - 4(2)(2) = 9 - 16 = -7$$

36) Simplify:  $\sqrt[3]{54}$ 

$$\sqrt[3]{27} \sqrt[3]{2} = 3\sqrt[3]{2}$$

$$1, 8, 27, 64, 125$$

What is the quotient when  $(t^4 - 3t^3 + t^2 + 6t - 2)$  is divided by  $(t^2 + 2)$ ?

$$\begin{array}{r} \phantom{+2+0t+2} \overline{t^4 - 3t^3 + t^2 + 6t - 2} \\ \underline{-(t^4 + 0t^3 + 2t^2)} \phantom{-2} \\ -3t^3 - t^2 + 6t \phantom{-2} \\ \underline{-(-3t^3 + 0t^2 - 6t)} \phantom{-2} \\ -t^2 + 12t - 2 \\ \underline{-(-t^2 + 0t - 2)} \\ 12t \end{array}$$

38) Simplify:  $\frac{-5}{3-a} \div \frac{10}{a-3}$ 

$$\frac{-5}{3-a} \cdot \frac{a-3}{10} = \frac{1}{2}$$